SHUNT ACTIVE POWER FILTER OPERATING WITH A MULTI-VARIABLE FILTER AND NEW REFERENCE CURRENT GENERATION FOR HARMONICS AND REACTIVE POWER COMPENSATION

ABDURAHIM DAHIR AWEYS

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Faculty of Electrical Engineering
Universiti Teknologi Malaysia

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This project report is dedicated to my family for their endless support and encouragement particularly to my lovely Mum, Amina M. Mohamed and my late father, M. Dahir Haji Aweys.
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ABSTRACT

A brief overview of sources of harmonic distortion and their impact on electrical power distribution system is described in this thesis. The operation of common harmonic mitigation schemes namely passive power filters and shunt active power filter are presented and analysed. A new reference current generation scheme based on instantaneous Reactive power theory suitable for three-phase shunt active power filter control circuit under balanced and unbalanced load condition is developed. The developed control circuit is based on the Multi-Variable Filter (MVF) which is used to remove the harmonic components of the load current (Harmonic) and gives the fundamental part. The effectiveness of the proposed scheme is mathematically calculated and verified by MATLAB/Simulink simulation.
ABSTRAK

Satu gambaran ringkas mengenai sumber herotan harmonik dan kesannya terhadap sistem pengagihan kuasa electkik taleh dinyatakan di dalam tesis ini. Skim operasi yang biasa digunakan untuk mengurangkan harmonic iaitu penapis kuasa pasif dan penapis kuasa aktif pirau telah dibentangkan dan dianalisis. Skim arus janaan rujukan baru berdasarkan pada teori kuasa reaktif serta-merta yang sesuai untuk litar kawalan tiga fasa penapis kuasa aktif pirau di bawah keadaan beban yang seimbang dan tidak seimbang telah dibargunkan. Litar kawalan yang dibangunkan adalah berdasarkan pada Multi-variable Filter (MVF) yang digunakan untuk mengeluarkan komponen-komponen harmonik daripada arus beban dan memberikan arus asas. Keberkesanan skim yang taleh dicadangkan dikira menggunakan kiraan matematik dan disahkan menggunakan simulasi MATLAB/Simulink.